SYSTEM AND METHOD FOR DISTRIBUTED UTILITY SERVICE EXECUTION

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application Ser. No. 62/682,129, filed Jun. 7, 2018, entitled SYSTEM AND METHOD FOR DISTRIBUTED UTILITY SERVICE EXECUTION (Attorney Docket No. X61), which is incorporated herein by reference in its entirety.

BACKGROUND

[0002] The present teachings relate generally to utility services. For example, the present teachings can relate to assisted delivery of goods originating at distributed establishments and destined for customers located in the vicinity of the distributed establishments. What is needed is a system that can accommodate trips of various lengths, and can solve the problem of short-distance assistance to customers. What is further needed is a system that can accommodate semi-autonomous and autonomous operation, and can deliver utility services economically.

SUMMARY

[0003] The utility system of the present teachings solves the problems stated herein and other problems by one or a combination of the features stated herein.

[0004] The system of the present teachings can be part of a fleet network of similar systems. The fleet network can also include trucks, planes, cars such as self-driving cars, and business establishments. All members of the fleet network can communicate seamlessly to share, for example, but not limited to, navigation data, dynamic objects, alternate routing, and utility requirements including utility characteristics, customer location, and destination. The system of the present teachings can interface with existing truck systems so that the fleet is seamlessly connected. Piloted utility vehicles can include technology disclosed in U.S. patent application Ser. No. 15/600,703 filed on May 20, 2017, entitled Mobility Device.

[0005] The utility robot of the present teachings can operate in an autonomous or semi-autonomous mode. The autonomous utility robot can, in conjunction with the network, control its movement without the assistance of an operator. The semi-autonomous utility robot can include technology that can receive and process input from the operator of the semi-autonomous utility robot. The input can, for example, but not limited to, override autonomous control of the utility robot, or be considered in controlling the utility robot, or be ignored. The utility robot can include a set of sensors appropriate for the location of the utility robot. For example, when the utility robot is deployed in an environment that includes many other members of the fleet network, the utility robot can include a first number of sensors. In some configurations, for example, in an environment that includes a relatively small number of members of the fleet network, the utility robot can include a second number of sensors. The sensors can operate in conjunction with sensors that are associated with other members of the fleet network. In some configurations, the utility robot can include enough physical storage space to accommodate delivery items from typical distributed sources such as pharmaceuticals, food, meals, and documents. The utility robot can operate on city sidewalks, and near and within buildings, among other places. The utility robot can include the capability to determine a current location and situation of the utility robot (localization), through the use of, for example, but not limited to, fiducials, sensors, external application data, operator input, beacons, and physical orientation of the utility robot. The utility robot can plan a route to reach a desired destination, detect obstacles along the route, and dynamically determine specific actions that the utility robot is to take based on the route, current location, and obstacles. Obstacles can include, but are not limited to including, dynamic (mobile) obstacles, such as, for example, but not limited to, pedestrians, vehicles, animals, and static obstacles such as, for example, but not limited to, trashcans, sidewalks, trees, buildings, and potholes. The utility robot can accommodate map matching including locating obstacles visually and matching them to other data such as, for example, satellite data. The utility robot can determine preferred routes and routes to be avoided. In some configurations, the utility robot can climb curbs. In some configurations, the utility robot can climb stairs. The utility robot can achieve stabilized operation while on four wheels, including while climbing stairs. The utility robot can maintain a pre-selected distance, which could vary along the route, from an obstacle such as, for example, but not limited to, a building. The utility robot of the present teachings can be driven by an operator who is seated upon a seating feature of the utility robot. In some configurations, the utility robot can take the form of a wheelchair, and can thus legally traverse sidewalks in all jurisdictions. The utility robot can accommodate disabled operators, and can include carrying capacity for, for example, but not limited to, pizzas and pharmaceuticals. In some configurations, the utility robot can follow rules of the road to maintain the safety of the utility robot, the operator of the utility robot (when present), and the people and obstacles encountered by the utility robot. The rules can include, for example, but not limited to, what to do when encountering an obstacle and what to do when crossing a road. For example, the rules can include prohibitions on rolling over someone or something, and traveling into unsafe places. The rules can also include prohibitions on stopping in unsafe locations, for example, the middle of an intersection. In general, safety protocols can be established and learned by the utility robot of the present teachings.

[0006] The utility robot of the present teachings can serve many purposes. The utility robot of the present teachings can be summoned to assist an individual in carrying heavy things, for example, to a bus stop. In some configurations, the utility robot of the present teachings can watch for threats and odd occurrences, and can be summoned to escort individuals from place to place. In some configurations, the utility robot of the present teachings can be summoned by a mobile device, to a location that can change between the summons and the rendez-vous of the utility robot and the mobile device. The utility vehicle can transport items from one location to another, for example, from a pharmacy to the residence of the person ordering the pharmaceuticals. The utility robot can communicate with pedestrians and vehicles, for example, by gesturing and providing awareness feedback.

[0007] In some configurations, the utility robot of the present teachings can travel at least fifteen miles at sixteen